

Safety Plan Lane Assistance

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# Document history

**[Instructions: Fill in the date, version and description fields. You can fill out the Editor field with your name if you want to do so. Keep track of your editing as if this were a real world project.**

**For example, if this were your first draft or first submission, you might say version 1.0. If this is a second submission attempt, then you'd add a second line with a new date and version 2.0]**

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| 17/08/2019 | 1.0 | Sidharth Das | Creating safety plan |
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**[Instructions: We have provided a table of contents. If the table of contents is not showing up correctly in your word processor of choice, please update it. The table of contents should show each section of the document and page numbers or links. Most word processors can do this for you. In** [**Google Docs**](https://support.google.com/docs/answer/116338?co=GENIE.Platform%3DDesktop&hl=en)**, you can use headings for each section and then go to Insert > Table of Contents.** [**Microsoft Word**](https://support.microsoft.com/en-us/help/285059/how-to-create-a-table-of-contents-by-marking-text-in-word) **has similar capabilities]**

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# Introduction

## Purpose of the Safety Plan

**[Instructions: Answer what is the purpose of a safety plan?]**

The safety plan is critical to any functional safety project. It defines the roles and outlines the steps to achieve functional safety.

## Scope of the Project

**[Instructions: Nothing to do here. This is for your information.]**

For the lane assistance project, the following safety lifecycle phases are in scope:

Concept phase

Product Development at the System Level

Product Development at the Software Level

The following phases are out of scope:

Product Development at the Hardware Level

Production and Operation

## Deliverables of the Project

**[Instructions: Nothing to do here. This is for your information.]**

The deliverables of the project are:

Safety Plan

Hazard Analysis and Risk Assessment

Functional Safety Concept

Technical Safety Concept

Software Safety Requirements and Architecture

# Item Definition

**[Instructions:**

**REQUIRED**

**Discuss these key points about the system:**

**What is the item in question, and what does the item do?**

For the functional safety module, the item to investigate is a simplified version of a Lane Assistance System.

When the driver drifts towards the edge of the lane, two things will happen:

1. the **lane departure warning function** will vibrate the steering wheel
2. the **lane keeping assistance function** will move the steering wheel so that the wheels turn towards the centre of the lane

**What are its two main functions? How do they work?**

The two main functions of the Lane Assistance System are – lane departure warning and lane keeping assistance. They work in the following way.

The **lane departure warning function** shall apply an oscillating steering torque to provide the driver a haptic feedback. In other words, the vehicle quickly moves the steering wheel back and forth to create a vibration. This is how it vibrates the steering wheel.

The **lane keeping assistance function** shall apply the steering torque when active in order to stay in ego lane. Ego lane refers to the lane in which the vehicle currently drives. This is how it automatically assists driver, by turning steering wheel towards center of lane.

When the camera senses that the vehicle is leaving the lane, the camera sends a signal to the electronic power steering system asking to turn and vibrate the steering wheel.

The camera sensor will also request that a warning light turn on in the car display dashboard. That way the driver knows that the lane assistance system is active

If the driver uses a turn signal, then the lane assistance system deactivates so that the vehicle can leave the lane. The driver can also turn off the system completely with a button on the dashboard.

The driver is still expected to have both hands on the steering wheel at all times. The electronic power steering subsystem has a sensor to detect how much the driver is already turning. The lane keeping assistance function will merely add the extra torque required to get the car back towards center. The extra torque is applied directly to the steering wheel via a motor.

**Which subsystems are responsible for each function?**

For the **lane departure warning function**, the Camera sub-system, the Electronic Power Steering subsystem and the Car Display Subsystem are responsible.

For the **lane keeping assistance function**, the Camera sub-system and the Electronic Power Steering subsystem are responsible.

**What are the boundaries of the item? What subsystems are inside the item? What elements or subsystems are outside of the item?**

The Camera sub-system, the Electronic Power Steering subsystem and the Car Display Subsystem are inside the Lane Assistance Item.

The steering wheel sub system is outside the item

**OPTIONAL**

**Optionally, include information about these points as well. These were not included in the lectures, but you might be able to find this information online:**

* **Operational and Environmental Constraints. This could especially be limited to camera performance; lane lines are difficult to detect in snow, fog, etc**
* **Legal requirements in your country for lane assistance technology**
* **National and International Standards Related to the Item**
* **Records of previously known safety-related incidents or behavioral shortfalls**

**]**

# Goals and Measures

## Goals

**[Instructions:**

**Describe the major goal of this project; what are we trying to accomplish by analyzing the lane assistance functions with ISO 26262?]**

## Measures

**[Instructions:**

**Fill in who will be responsible for each measure or activity. Hint: The lesson on Safety Management Roles and Responsibilities.**

**The options are:**

**All Team Members**

**Safety Manager**

**Project Manager**

**Safety Auditor**

**Safety Assessor**

**]**

|  |  |  |
| --- | --- | --- |
| Measures and Activities | Responsibility | Timeline |
| Follow safety processes | All Team Members | Constantly |
| Create and sustain a safety culture | All Team Members | Constantly |
| Coordinate and document the planned safety activities | Safety Manager | Constantly |
| Allocate resources with adequate functional safety competency | Project Manager | Within 2 weeks of start of project |
| Tailor the safety lifecycle | Safety Manager | Within 4 weeks of start of project |
| Plan the safety activities of the safety lifecycle | Safety Manager | Within 4 weeks of start of project |
| Perform regular functional safety audits | Safety Manager | Once every 2 months |
| Perform functional safety pre-assessment prior to audit by external functional safety assessor | Safety Auditor | 3 months prior to main assessment |
| Perform functional safety assessment | Safety Assessor | Conclusion of functional safety activities |

# Safety Culture

**[Instructions:**

**Describe the characteristics of your company's safety culture. How do these characteristics help maintain your safety culture? Hint: See the lesson about Safety Culture**

**]**

1. The safety culture pegs safety at the highest priority level over competing constraints like cost and productivity.
2. Accountability ensures design decisions are well documented and traceable to individuals
3. Safe systems and designs are rewarded whereas shortcuts that jeopardize safety or quality are penalized
4. The team that designs and develops product is independent from the team that audits.
5. Company design and management processes are well defined.
6. Proper meetings and reviews form a medium of communication for disclosure of bottlenecks.
7. Appropriate resources with necessary skills share the project space.

# Safety Lifecycle Tailoring

**[Instructions:**

**Describe which phases of the safety lifecycle are in scope and which are out of scope for this particular project. Hint: See the** [**Intro section**](#_sh22j99mm02k) **of this document**

**]**

For the lane assistance project, the following safety lifecycle phases are in scope:

Concept phase

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Product Development at the Software Level

The following phases are out of scope:

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Production and Operation

# Roles

**[Instructions:**

**This section is here for your reference. You do not need to do anything here. It is provided to help with filling out the development interface agreement section.**

**]**

|  |  |
| --- | --- |
| Role | Org |
| Functional Safety Manager- Item Level | OEM |
| Functional Safety Engineer- Item Level | OEM |
| Project Manager - Item Level | OEM |
| Functional Safety Manager- Component Level | Tier-1 |
| Functional Safety Engineer- Component Level | Tier-1 |
| Functional Safety Auditor | OEM or external |
| Functional Safety Assessor | OEM or external |

# Development Interface Agreement

**[Instructions:**

**Assume in this project that you work for the tier-1 organization as described in the above roles table. You are taking on the role of both the functional safety manager and functional safety engineer.**

**Please answer the following questions:**

1. **What is the purpose of a development interface agreement?**

The development interface agreement demarcates design and production responsibility between OEM and tier 1 or between tier 1 and tier 2. It also specifies what evidence and work product each party needs to provide to prove that work was done as per agreement. The DIA serves below purpose:

1. Helps avoid disputes during planning and development of product
2. It incorporates liability by pointing to the party, best in position to fix a system if issues arise
3. **What will be the responsibilities of your company versus the responsibilities of the OEM? Hint: In this project, the OEM is supplying a functioning lane assistance system. Your company needs to analyze and modify the various sub-systems from a functional safety viewpoint.**

**]**

# Confirmation Measures

**[Instructions:**

**Please answer the following questions:**

1. **What is the main purpose of confirmation measures?**

Confirmation measures ensure

1. Process comply with functional safety standard
2. Project execution follows safety plan
3. Design improves safety

The people who carry out confirmation measures need to be independent from the people who actually developed the project.

1. **What is a confirmation review?**

Confirmation review ensures that the project complies with ISO 26262. As the product is designed and developed, an independent person would review the work to make sure ISO 26262 is being followed.

1. **What is a functional safety audit?**

Checking to make sure that the actual implementation of the project conforms to the safety plan is called a functional safety audit.

1. **What is a functional safety assessment?**

Confirming that plans, designs and developed products actually achieve functional safety is called a functional safety assessment.

**]**

A safety plan could have other sections that we are not including here. For example, a safety plan would probably contain a complete project schedule.

There might also be a "Supporting Process Management" section that would cover "Part 8: Supporting Processes" of the ISO 26262 functional safety standard. This would include descriptions of how the company handles requirements management, change management, configuration management, documentation management, and software tool usage and confidence.

Similarly, a confirmation measures section would go into more detail about how each confirmation will be carried out.